Building a Warning Decision Making Performance Pyramid
For Your Office

Supporting Eastern Region SOOs and DOHs

Warning Decision Training Branch

Ed Mahoney

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November 6, 2014
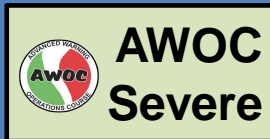
Transferring Training Into Performance

Warning Decision Making Training Performance Pyramid

Office Warning Performance

Warning Decision Making Training

Foundational Training

AWOC Severe

AWOC Flash Flood

AWOC Winter Wx

WSR-88D

AWOC Core WDM

DLOC

MRMS

AWIPS-2

Satellite

- LMS
- PDS
- WES-2 Bridge
- Storm of the Month
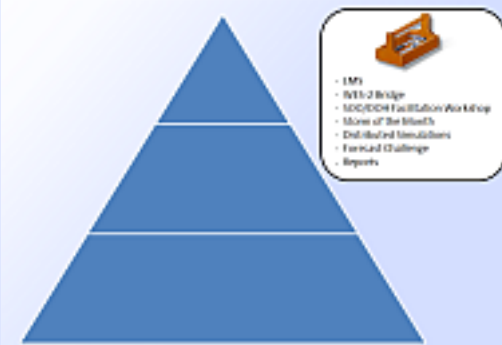- Forecast Challenge
- Reports
- SOO/DOH Facilitation Workshop
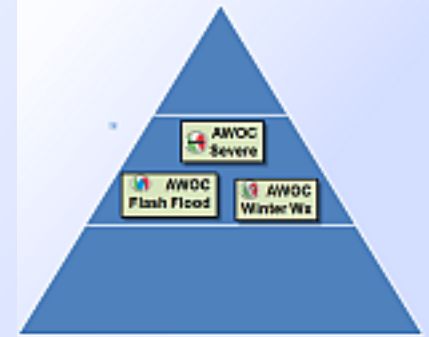
Training Tools

- LMS
  - Changing Vendor in June 2015
  - Cornerstone On Demand
- WES-2 Bridge
  - Fall 2014 Release with Archiver
  - WFO Hydrology Tools by September 2015
- SOO/DOH Facilitation Workshop
  - 14 New SOOs & DOHs in August 2014
- Storm-of-the-Month Webinars
  - Warning Decision Webinars Returning November 2014
  - MRMS Webinars to begin February 2015
- Distributed Simulations
  - Integrated into WES-2 Bridge Design in 2015
- Forecast Challenge
  - Supports Foundational Training & Optimal for WDM Training
  - Continuous Learning & Applied Learning
- Reports
  - Flexible and Easy to Use Lead to Improved Training Management

Foundational Training

- **WSR-88D**
  - Two Build Releases
  - Improving QPE, Microburst Detection, and SAILS
- **DLOC**
  - 71 New Meteorologists and Hydrologists in FY15
  - 4 Workshops in February and March
- **AWIPS-2**
  - Acceptance Training (Variance & NSHARP) for 1600 Forecasters
  - Focal Point Training
  - Stand-Alone AWIPS-2 Fundamentals for New Forecasters in June 2015
  - Hazard Services (initial Hydro Practice Mode)
  - Four Build Releases (Nov, Feb, June, & Sep)
- **MRMS**
  - Product Course in October 2014 with Product Guide
    - Product Guide Integrated into AWIPS
  - Application Course in synch with 14.3.1 (Feb 2015)
    - MRMS Storms of the Month
- **Satellite**
  - Integrate into Warning Decision Making Training
- **AWOC Core Decision Making**
  - New Social Media Stand-Alone Module (Oklahoma Tornadoes Service Assessment)

Warning Decision Making Training

- ## AWOC Severe
  - May to September 2015
  - Blended, Continuous, and Applied Learning
  - Stand-Alone 'Impact-Based Warning Training'
    - Released February 2015
    - Recommended for all Warning Forecasters
- ## AWOC Flash Flood
  - June to September 2015
  - First Training to Leverage WES-2 Bridge Capabilities
  - MRMS QPE integrated into Course
  - Follow-on to FY15 Mandatory Hydro Course for WFOs
- ## AWOC Winter
  - Restored by NWS Director
  - Winter Weather PDS Development Meeting June 2015
    - 18 Subject Matter Experts
 - Winter AWOC to start August 2016

WDTB's FY15 Training Deliverables

If You have Questions on these Training Opportunities Contact:

Ed.Mahoney@noaa.gov

(405) 325-1006

NWS Learning Center

- Status
  - Changing Vendor in 2015
  - New Vendor: Cornerstone On Demand
- Timeline (subject to change)
  - Award Contract: September
  - Lead Admin (Training Division)
    - Training: October
    - Pilot System Access: November
  - System Design: Dec-Feb
  - Facilitator Training: Mar-Apr
  - Go Live: June 1, 2015
- Data/Content Transfer
  - Historic Data (Date TBD)
  - Courses loaded by Go Live
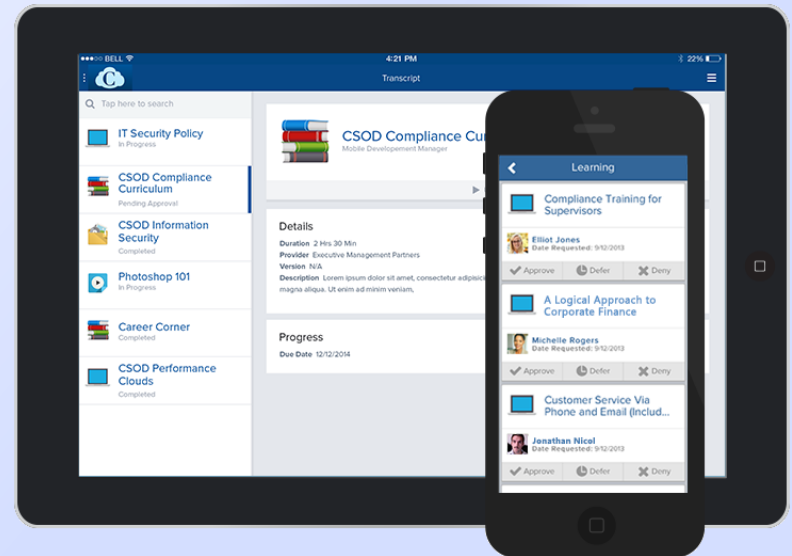
WES-2 Bridge
AWIPS-2 Archiver Training

- Status: Now!
  - Internal Review
  - External Review
- Designed For:
  - Archiver/WES Focal Points
  - SOOs
  - ITOs
- Prerequisite: AWIPS-2 Foundation Modules
- Includes:
  - Overview module
  - Detailed exercises
 - References
  - Checklist
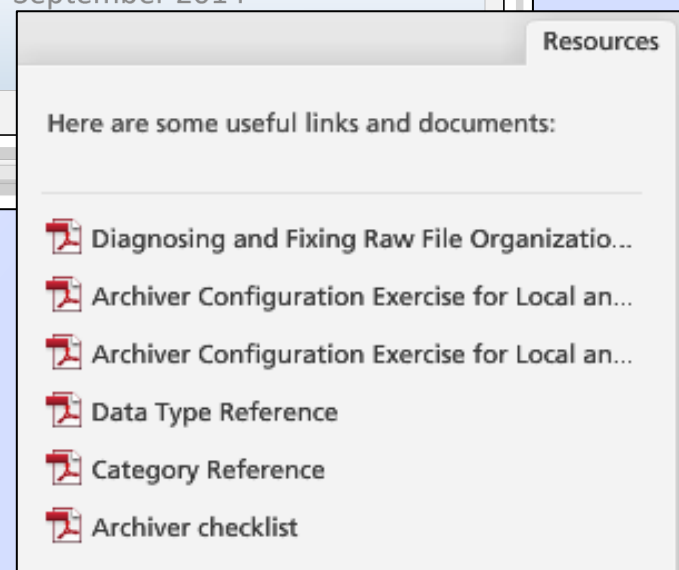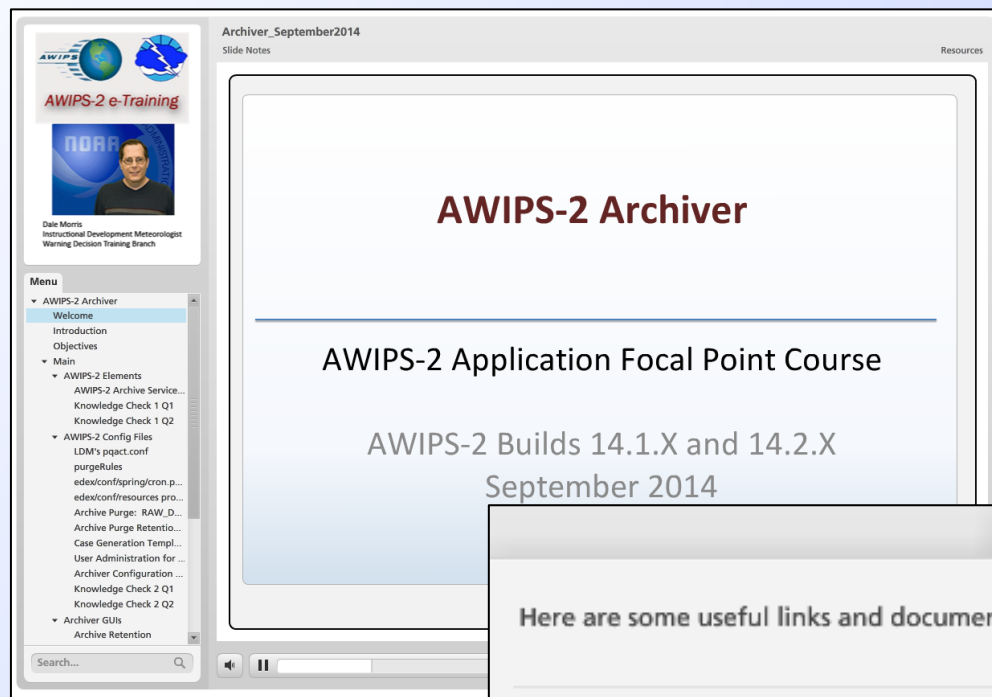
Archiver is functional. Significant improvements in 14.2.4.

WES-2 Bridge
# Fall 2014 WES-2 Bridge Release

- **WES-2 Bridge Modification Kit**
  - memory, hard drives, BluRay

- **WES-2 Bridge Implementation Plan Update**
  - connectivity, operations, and support

- **WES-2 Bridge Software**
  - Basic D2D/WarnGen case reviews & sims
  - Initial support for Distributed/Collaborative sims

- **WESSL-2 Software**
  - Multimedia (audio/video/etc), spotter reports, system commands
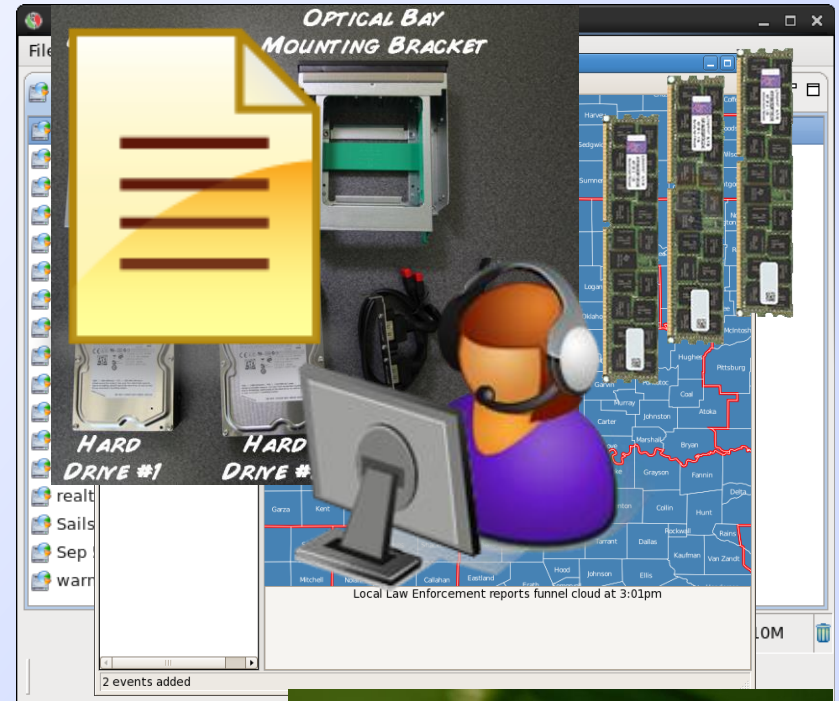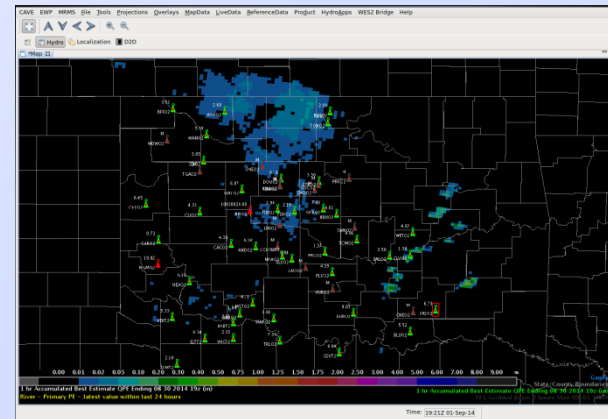
WES-2 Bridge
Subsequent FY15 WES-2 Bridge Releases

- Updates for AWIPS-2 DB changes and other A-2 s/w updates

- A-1 Case Conversion

- GFE Support

- Hazard Services Support

- Hydroapps Support
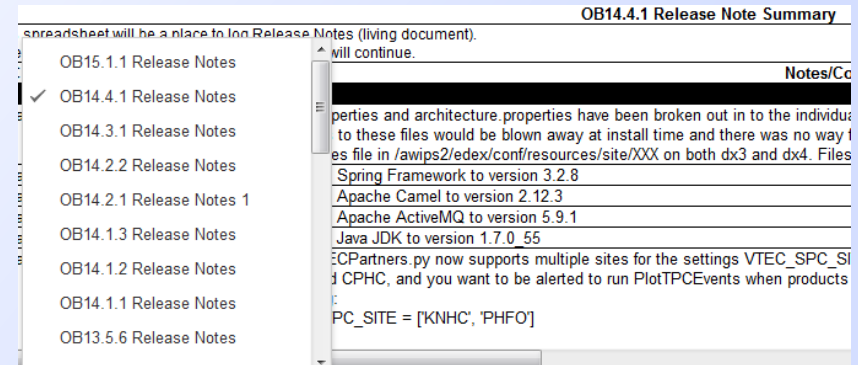
AWIPS-1 to AWIPS-2 Case Conversion

Hydroview/HydroApps
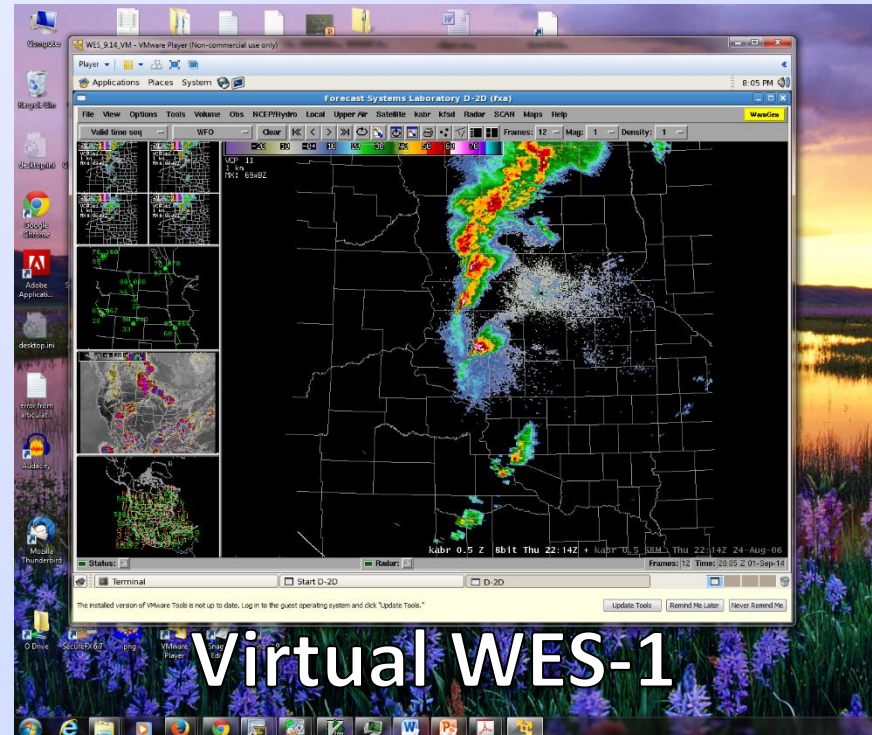
WES-2 Bridge
What about WES-1?

**WES-1
HP XW6200**

**WES-2 Bridge
HP Z600**

Spare Parts
WES-1 and WES-2 Bridge
Contact WDTB

**Virtual WES-1**

WES-2 Bridge
Design Goals

- AWIPS-2 software updated independently of WES-2 Bridge

- Manipulate time through software clock

- Eventual increased number of supported AWIPS components

- Preserve Existing Case Review Functions

- Support Distributed & Collaborative Simulations

- **Easier To Use**

WES-2 Bridge
Exercises and Simulations Starting in FY15

MRMS 3HR QPE

- AWOC Flash Flood

- AWOC Severe

- AWOC Winter

- DLOC/IWOC FY16 including AWIPS Fundamentals

- Hazard Services

- MRMS/FLASH: future warning process paradigm shifts

- Warning Related AWIPS/Radar Enhancements
    - Tracking Meteogram
    - NEXRAD Product Improvements

- WFO Hydrology
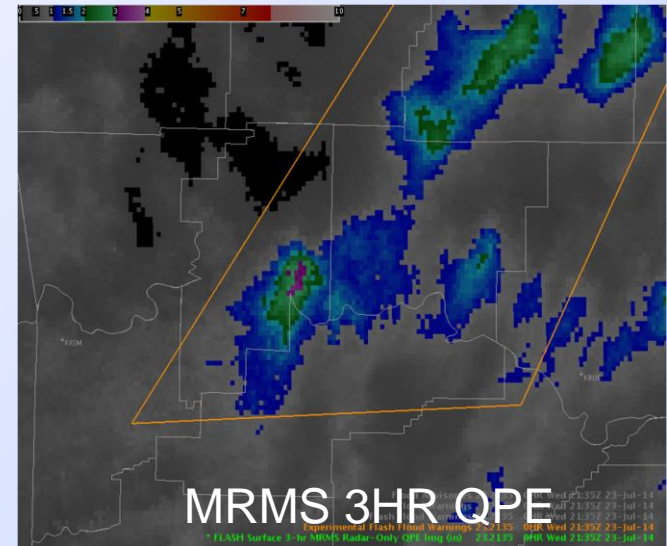
WES-2 Bridge
# Hydrologic Tools into WFO Simulations

- **Objective**: Provide Displaced Real-Time and Paused-Time Simulations for WFO Hydro Applications

- **Target Audiences**:
  - Forecasters
  - WES / Hydro Focal Points

- **Deliverables**:
  - Updated WES-2 Bridge software.
  - Corresponding simulation training module
  - "how-to" documentation for WES/Hydro focal points.
  - Simulation: dual-use case for AWOC Flash Flood (flash flood & river flood)

- **Risks:**
  - Hydro Apps design will hamper easy integration into WES-2 Bridge.
  - WDTB hydro modifications likely out of sync with AWIPS-2 updates
  - Difficulties in archiving all hydro data routinely at WFOs

- **Target Date:** End of FY15

AWIPS-2 Hydro Perspective
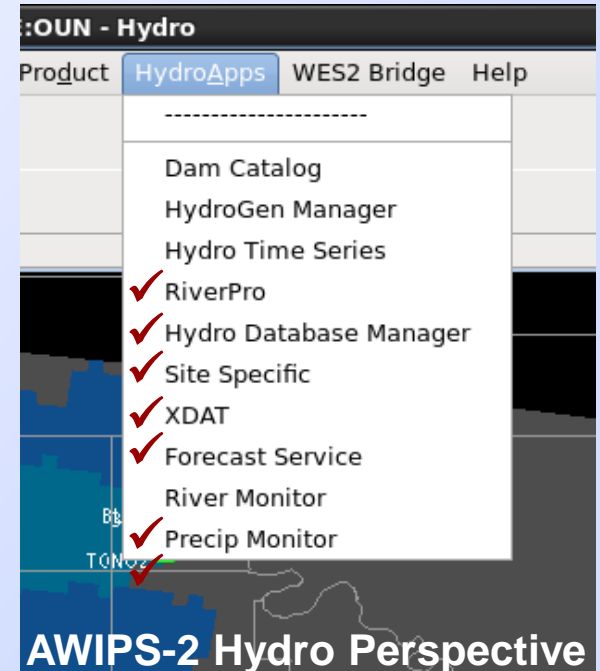
WES-2 Bridge
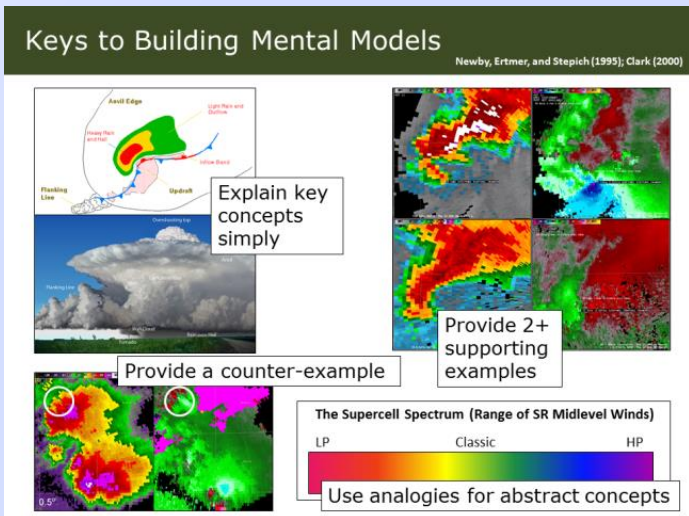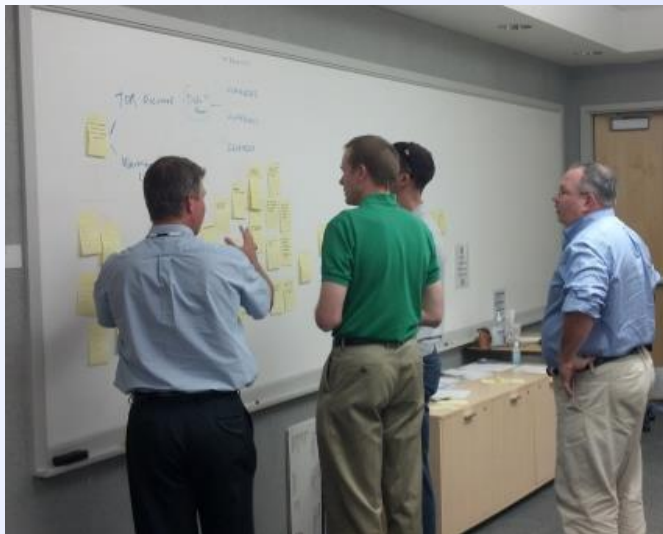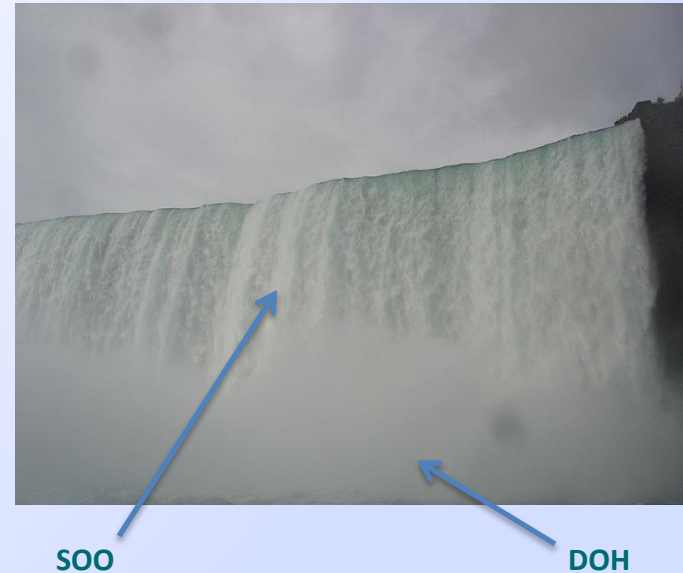# Hydrology Brings New Simulation Challenges

- Long duration events
  - Interval-Based Simulations
  - New WES-2 Bridge Fast-Forward/Skip capability
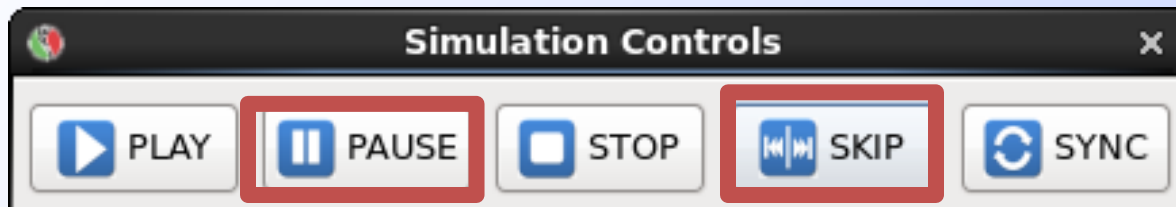
- No "archive" of all hydro data
  - WHFS database is "backed up", not archived
  - WHFS images (FFG/HPE/MPE) not 100% archived
  - A2 Archiver: new configuration to address shortcomings

SOO/DOH Facilitation Workshop

- Dates: August 25 – 28, 2015

- How to address your office's performance needs

- Adult Learning principles

- Instructional design

SOO

DOH

Keys to Building Mental Models

Explain key concepts simply

Provide a counter-example

Provide 2+ supporting examples

Use analogies for abstract concepts

Warning Decision Storm of the Month

- Requested by NWS Director in August
  - "Rapidly Spread Best Practices Throughout the NWS"
  - AWOC Funding Restored in FY15
- Approach: NWS operational speaker(s) telling the story of decision making experience
  - SME(s) available for post-talk Q&A as appropriate
- Schedule: 3rd Wednesday of each Month
  - Starting November 19 at noon CST
- Delivery:
  - Short & Focused (22 minute presentation)
  - Live session webinar with Q&A
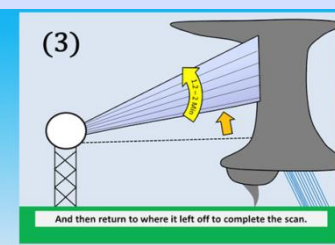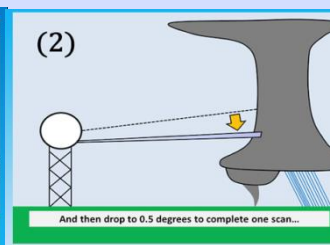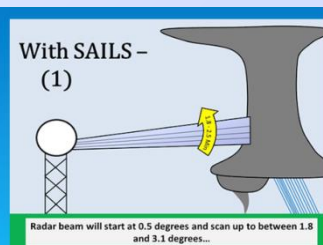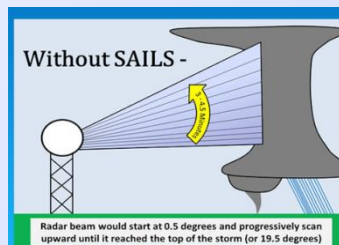 - Facilitated, recorded, post-processed to LMS

January 2012 Dual-Pol Storm of the Month

WDTB eLearning

Michael Scotten
Senior Forecaster
WFO Amarillo

WSR-88D
Build Training

	RDA/RPG Build 15.0	RDA/RPG Build 16.0
Content	• RDA hardware update • RPG changes to improve QPE performance and dual pol data quality	• RPG hardware update • Automated Microburst Detection Algorithm • 2D Velocity Dealising Algorithm update • dual pol products included in SAILS scan
Schedule	• Beta: Sept 2014 • Deployment : Nov 2014	• Spring 2015
Target	• Expected: WSR-88D Focal Point • SOO/DOH Determined: Staff who use WSR-88D	
Delivery	• Web Module • WDTB-Developed Documentation	

Without SAILS - Radar beam would start at 0.5 degrees and progressively scan upward until it reached the top of the storm (or 19.5 degrees)

With SAILS – (1) Radar beam will start at 0.5 degrees and scan up to between 1.8 and 3.1 degrees...

(2) And then drop to 0.5 degrees to complete one scan...

(3) And then return to where it left off to complete the scan.

WSR-88D
DLOC – Distance Learning Operations Course

- Status
  - Fully Funded in FY15
  - Enrollment Now Closed
    - 70 Students
- Delivery Dates
  - Launch: October 21
  - Workshops (4) Jan to Mar 2015
- Delivery Method – Blended
  - Online Courses
  - Instructor-Led Teletraining
  - Simulations
  - In Residence Workshop
- Audience: NWS Interns

Distance Learning Operations Course

Topic 7: Convective Storm Structure and Evolution
Presented by the Warning Decision Training Branch

AWIPS-2
Supporting Variance and Focal Point Training

1. **System Admin Training**
   - ESA/ITO
   - *Refresher training module now available

2. **AWIPS-2 Variances & NSHARP Courses**
   - All forecasters who use AWIPS

<u>Required</u> Training Before AWIPS-2 Install

3. **AWIPS Application Focal Point Course**
   - AWIPS Focal Points

Training Recommended But <u>Not Required</u>

AWIPS-2 Training

AWIPS-2 is Coming to a WFO Near you!

Get started on your AWIPS-2 Training today. For detailed info, visit:

- AWIPS 2 Transition Page
- AWIPS 2 Exercise Page

Welcome Mike Magsig (l) | Search | Logout

NWS LEARNING CENTER
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

MY TRAINING   HOT COURSES   COURSE CATALOG   REQUIRED TRAINING   LEARNING CENTERS   NEED HELP?

AWIPS-2 Transition Training Page

links validated 7/2/13

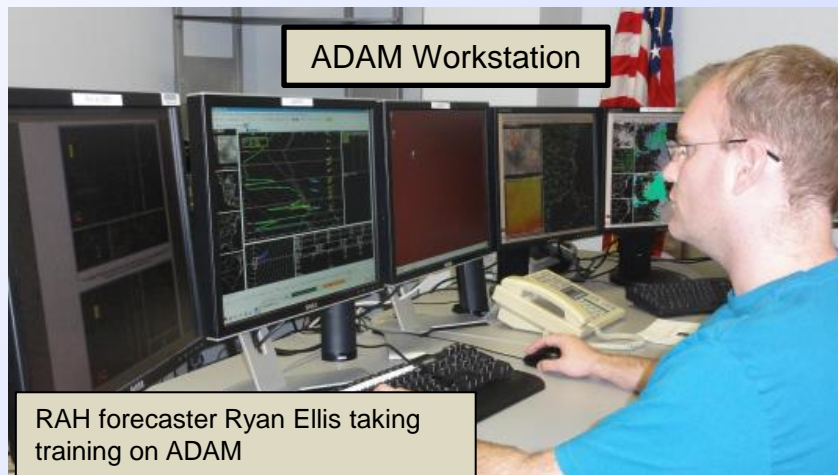**Introduction to AWIPS-2 Training**

This page contains links to all training applicable to the AWIPS-2 transition. This page is currently divided into three sections:

1. User Training
2. System Administration Training
3. Application Focal Point Transition Training

AWIPS-2
Variances & NSHARP Courses

- AWIPS-2 interface changes
  - 5 to 7 hours

- Required to be taken within specific 5-week period prior to install
  - Designed to be taken on ADAM for applied components
  - Designed to be reference from LXs

Variances Course

ADAM Workstation

RAH forecaster Ryan Ellis taking training on ADAM

NSHARP Course

AWIPS-2
Application Focal Point Course

- How to configure and troubleshoot applications in AWIPS-2
  - Distance-learning overviews and applied exercises

- Step 1: Foundational
  - 5 core AWIPS-2 modules
  - Prerequisites for step 2

- Step 2: Applications
  - 15+ areas: Derived Parameters, GFE, FFMP, etc.
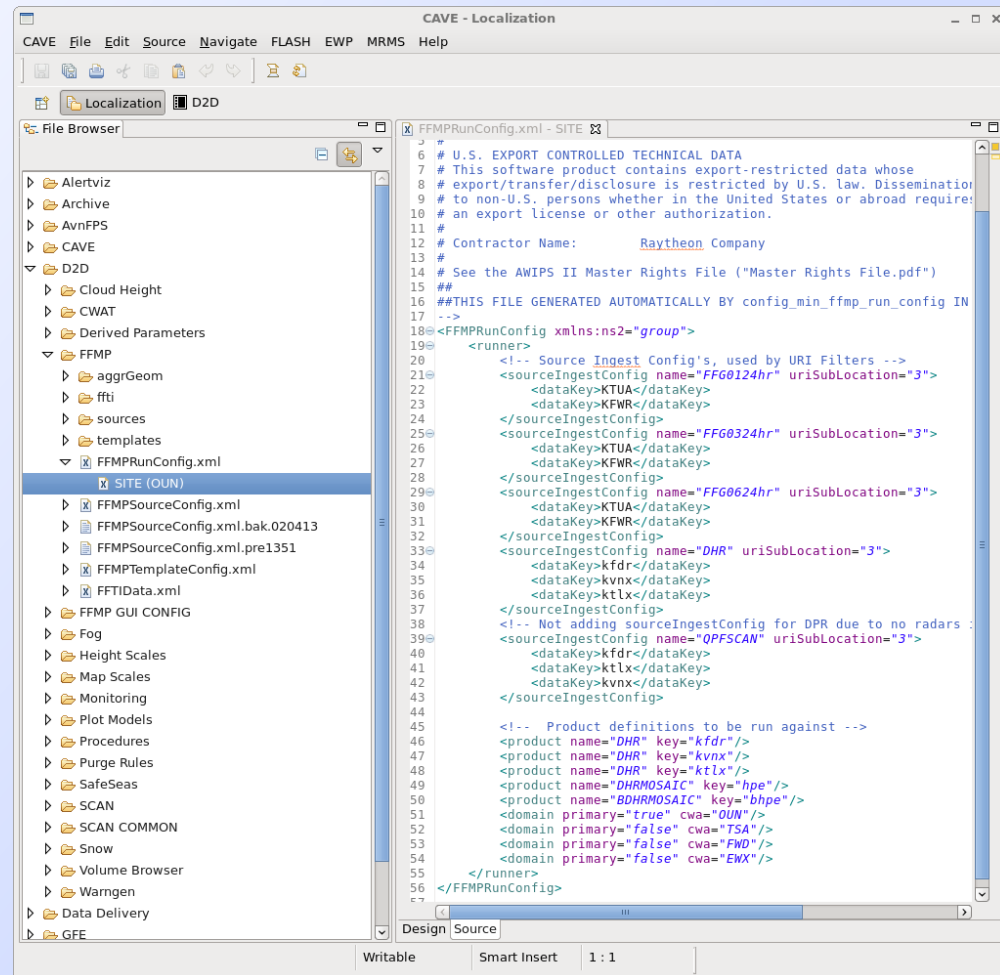
AWIPS-2
SOO Preparation for AWIPS-2 Activation

- 3 to 4 months prior
  - ITO and AWIPS Focal Points take foundational modules and application modules to assist local migration
  - Shortly before install, ESA/ITO take refresher admin training

- Variance Training Window opens
  - Have ITO install latest AWIPS-2 build on ADAM, link to training
  - All forecasters take Variances exam and NSHARP exam before installation
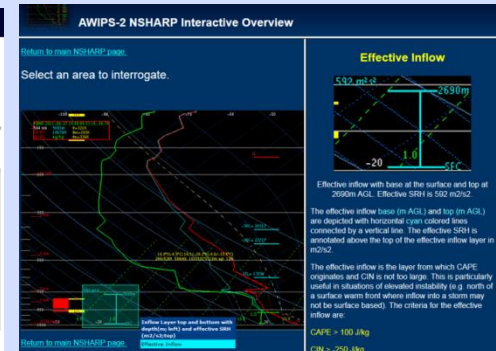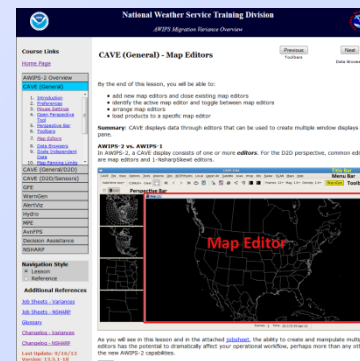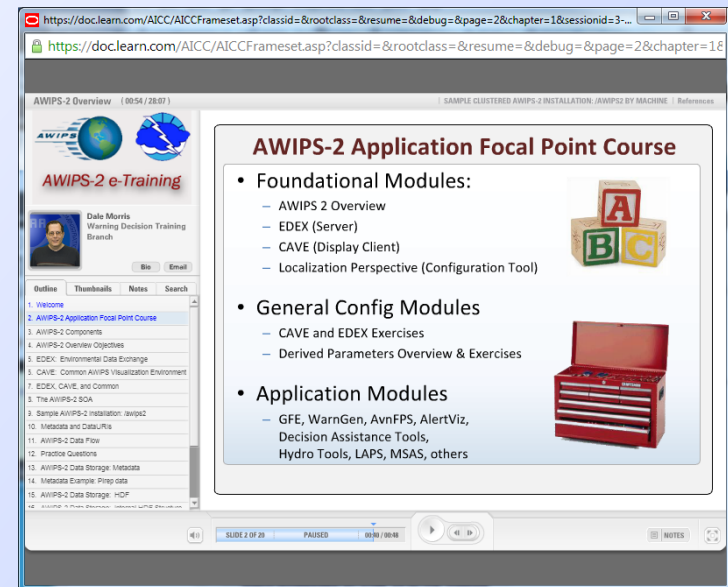
AWIPS-2
AWIPS-2 Fundamentals Course

- **Target Audience**:
  - New forecasters
  - Existing forecasters who need AWIPS refresher
  - Will develop AWIPS learning plans leveraging other existing AWIPS training

- **Delivery**: June 2015
  - Distance learning modules in LMS for AWIPS applications
  - WES-2 Bridge exercises
  - Readiness assessment component

- **Prerequisite for DLOC in FY16**
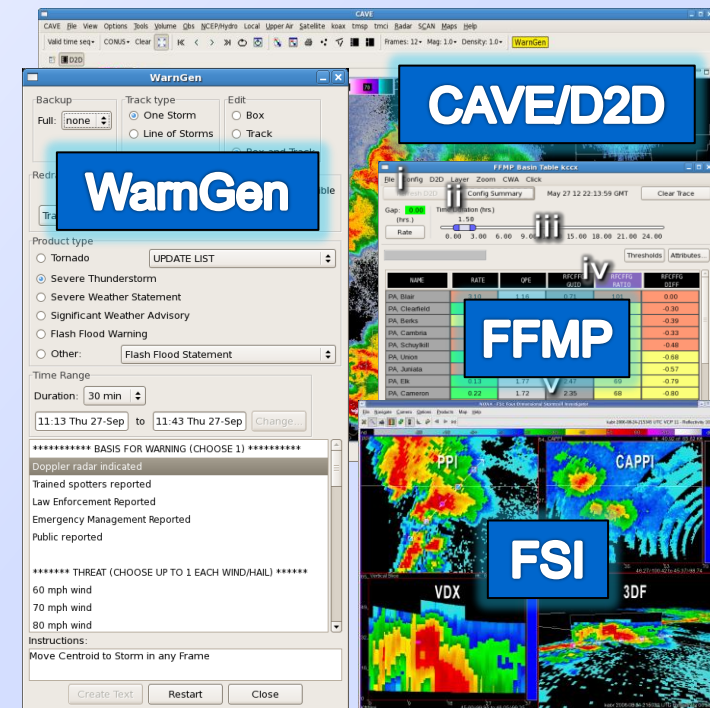
AWIPS-2
Build Training

- OB14.2.4 (Nov 2014)
  - SAILS labels
- OB14.3.1 (Feb 2015)
  - **Multi-Radar Multi-Sensor (MRMS)**
  - Dual Pol HPE/HPN precipitation mosaics
- OB14.4.1 (Jun 2015)
  - Tracking Meteogram
  - AMDA RPG microburst detection algorithm
  - Dual-Pol mosaics
  - ASR-11 and ARSR-4 precipitation
  - **Hazard Services practice mode**
- OB15.1.1 (Sep 2015)
  - Tornado track estimation tool
  - Autonowcaster boundary layer tool
  - HCA hail severity
  - **Hazard Services practice mode**

AMDA Microburst Detection With Delta-V

Tracking Meteogram Applied To IR Temperature Time Trend

IR Satellite (C)
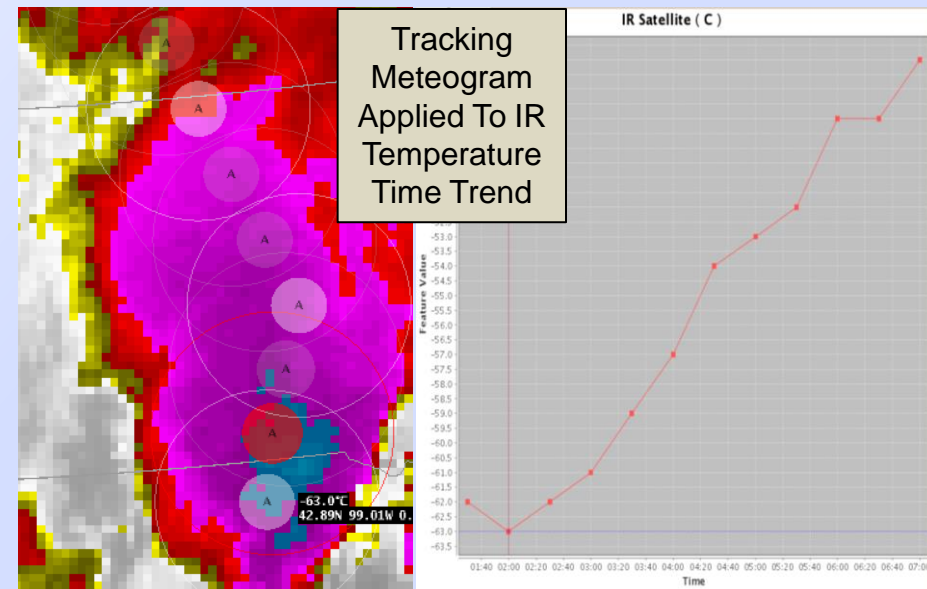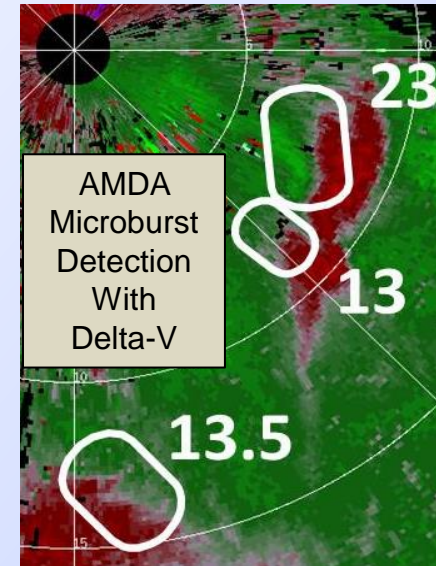
AWIPS-2
Hazard Services (Initial Deployment)

- Only Hydro in Practice Model Initially

- Combines WarnGen, GHG, and Riverpro

- Multi-stage deployment
  - First phase just hydro (flood, flash flood) in 14.4.1 or 15.1.1
  - Recommenders provide first guess hazards
    - Eventually create your own
  - Eventually all hazards operational
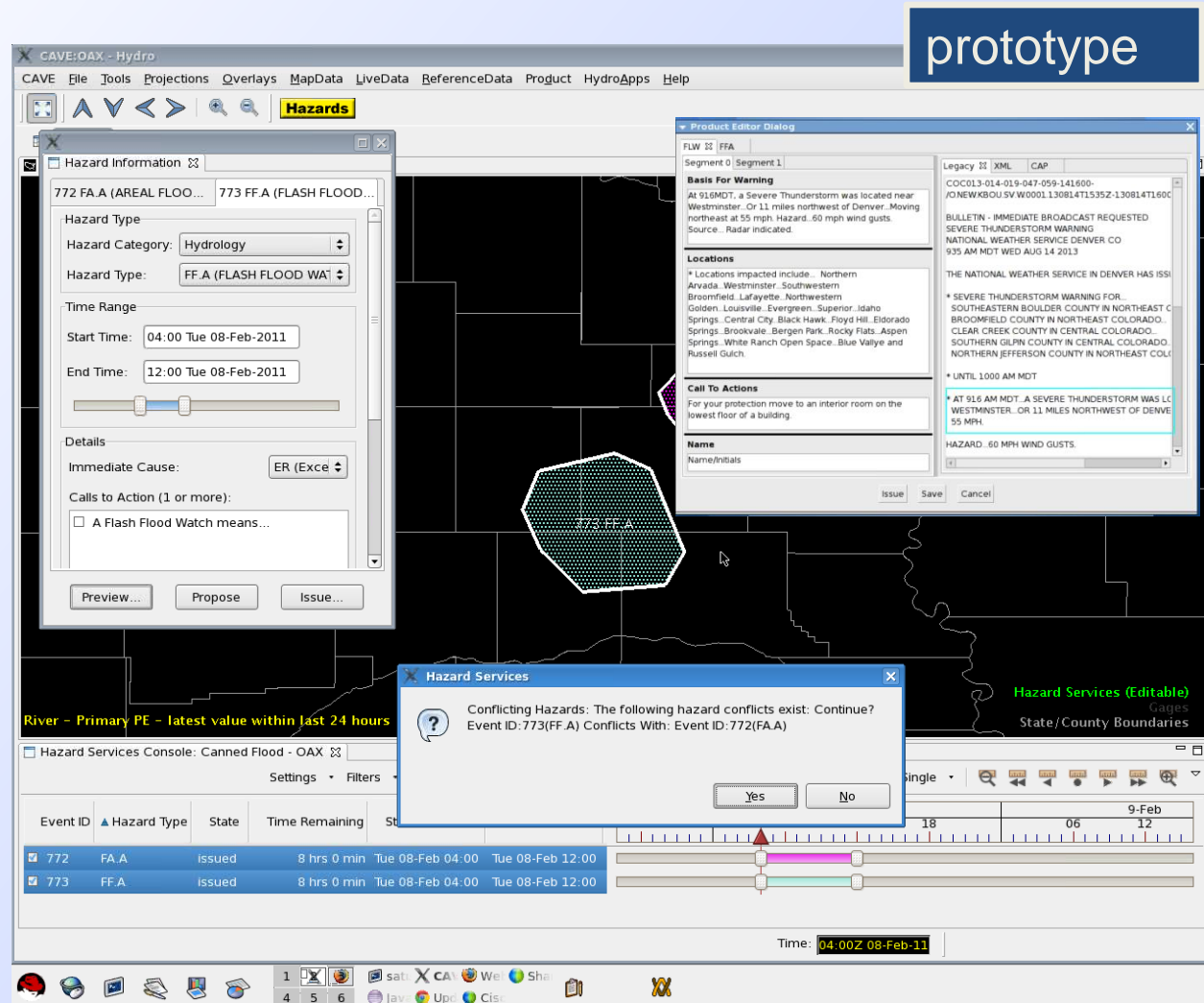
MRMS
Foundational Product Course

- Deployed by October 10, 2014

- MRMS Product Guide
  - On-Line Reference
  - Integrated into AWIPS Build 14.3.1 in February 2015

- LMS Asynchronous presentations (~20 minutes each)
  - MRMS Concept of Operations
  - Reflectivity creation
  - Hail products
  - Velocity-based products
  - Precipitation estimation

MRMS
Severe Convection Decision Products

Objectively blends data to produce highly-robust decision assistance products:

- multiple-radar 3D cubes
- Surface
- Upper Air
- Lightning
- Satellite
- NWP
- Environmental data

Vertically Integrated Liquid (VIL)

50 dBZ Echo Tops

Reflectivity at -20°C

50 dBZ to 0°C Thickness

Max Estimated Size Hail (MESH)

MESH Swath
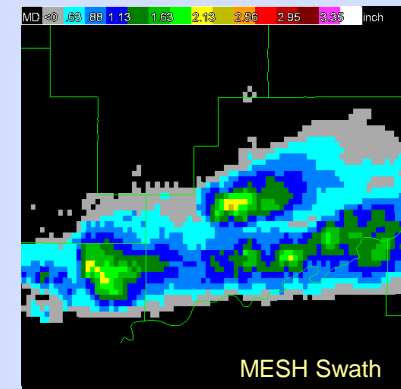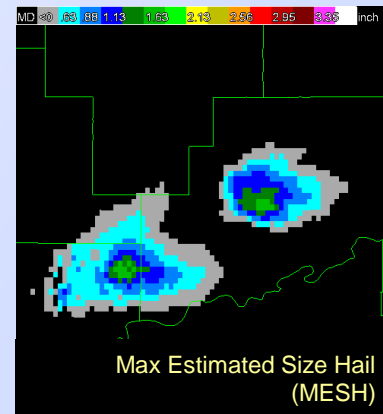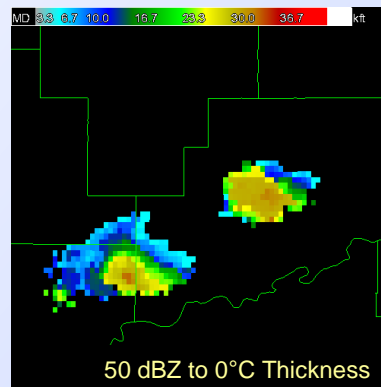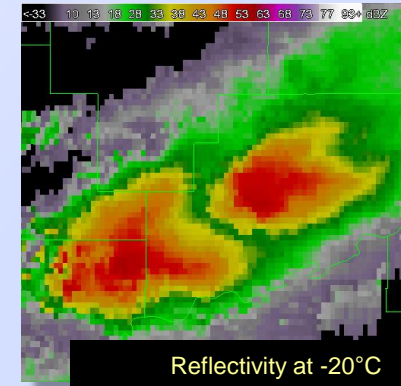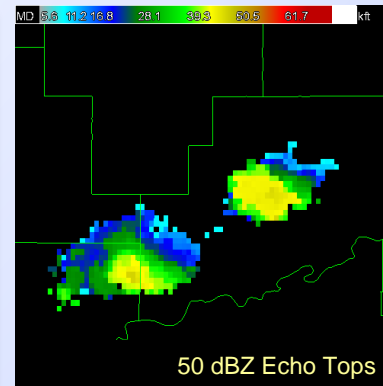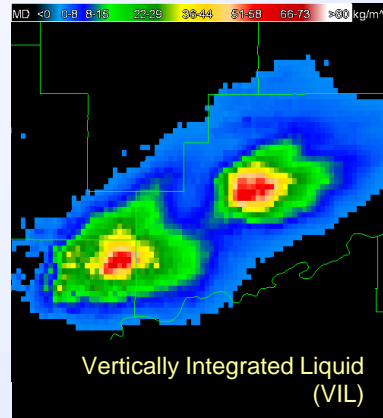
MRMS
Rotation Tracks
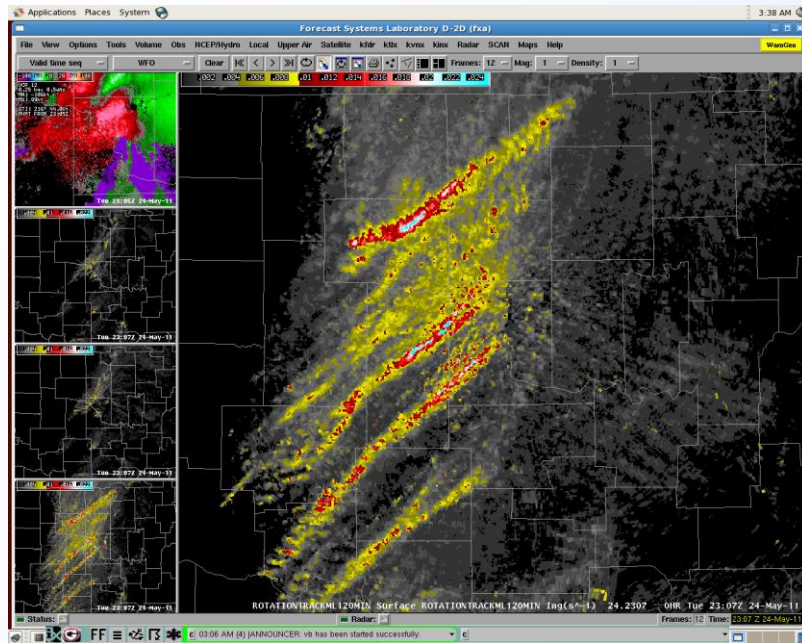
Rotation Track 0-2 km AGL
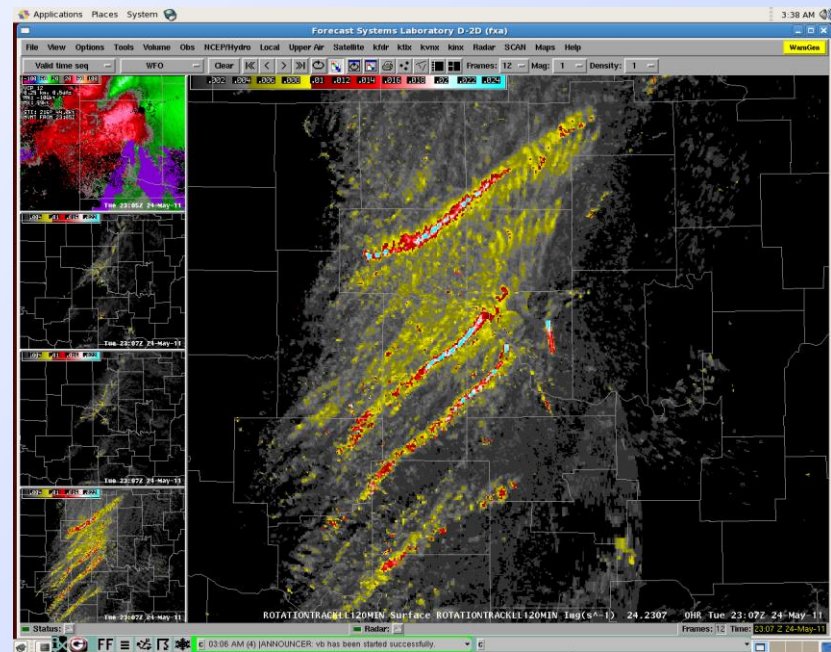
Rotation Track 3-6 km AGL

30-, 60-, 120-, 240-, 360-, 1440-min accumulations

MRMS
Applications Course

- Deployed with AWIPS2 build 14.3.1 containing MRMS SBN-based data feed
  - Scheduled for February 2015
- Short job-oriented exercises using WES-2
  - Public Severe
  - Hydro: Limited to Rainfall Estimation
  - Aviation Support
- MRMS Storms of the Month
  - Eight scheduled in FY15
  - Peer-to-Peer Sharing of Best MRMS Practices

MRMS
Influence of continuous updating

Information Void(s)

Outlooks

Watches

Pre-warning

Warnings

Pre-watch

Time

Days

Hours

Minutes

Event

Space

Regional

State

Local

Adapted from Dr. Heather Lazrus (SSWIM) and
Lans Rothfusz (NSSL)
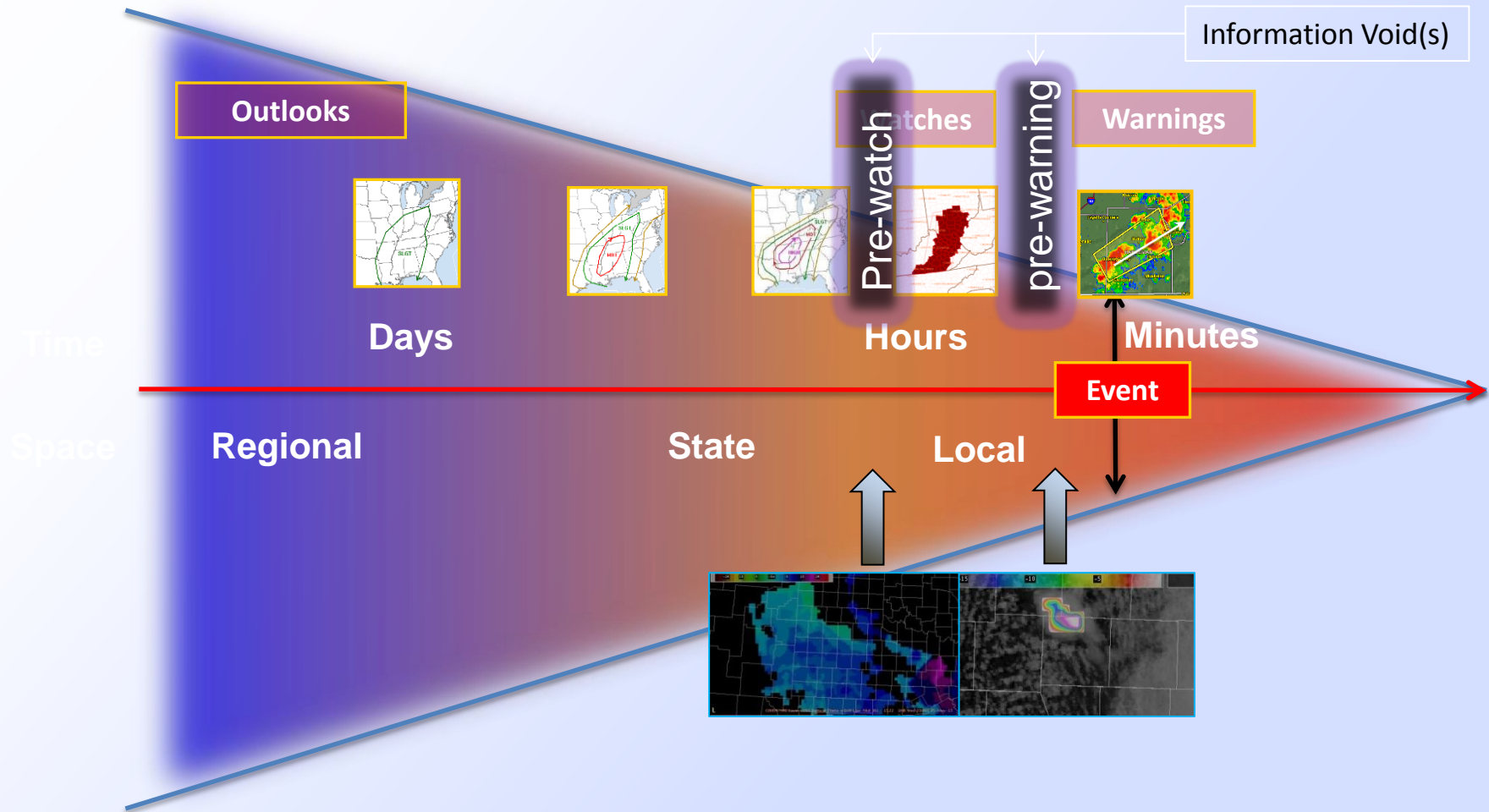
GOES-R & Satellite
Full Integration Into Warning Decisions

FY15	• **Introduction to Increasing Use of Satellite in Warning Operations** • **Use AWOC as Teaching Platform** • **Leverage Existing Foundational Satellite Training**
FY16	• **Emphasize new GOES-R products into Warning Operations:** ➢ **Core Decision Making, Severe, Hydro, Winter Service** • **Enhance AWOC Capabilities as teaching platform** • **Infusion with main GOES-R training efforts**
Launch & Beyond	• **Fully Support NWS GOES-R & Satellite Training Requirement** ➢ **Lessons, Webinars, Applied Learning, Forecast Challenges** • **AWOC will integrate Actual GOES-R Data into Warning Decision:** ➢ **Exercises** ➢ **Simulations** • **Add Specific GOES-R Storms of the Month to the Webinar Cycle**

The Need for Integrated Training

Washington, D.C.   January 26, 2011
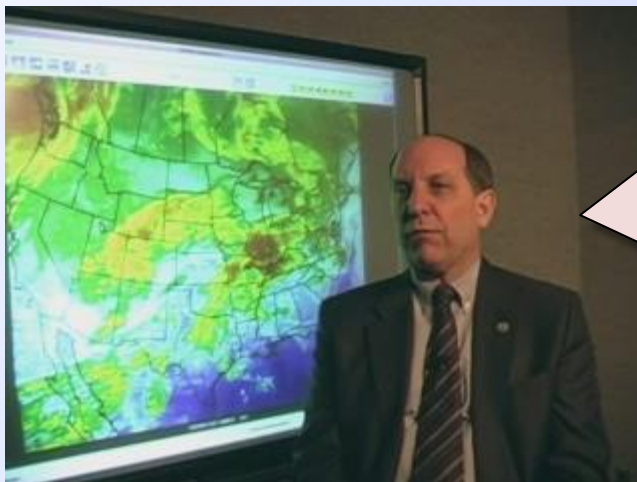
"…It is our personal responsibilities as scientists to learn as much as we can about the science of winter weather and take advantage of training such as the Advanced Warning Operations Course…"

-- Louis Uccellini (May 2006)

AWOC Core Decision Making

Delivery: May – Sep 2015

Duration: ~10 hours

Web-based and Instructor-Led modules
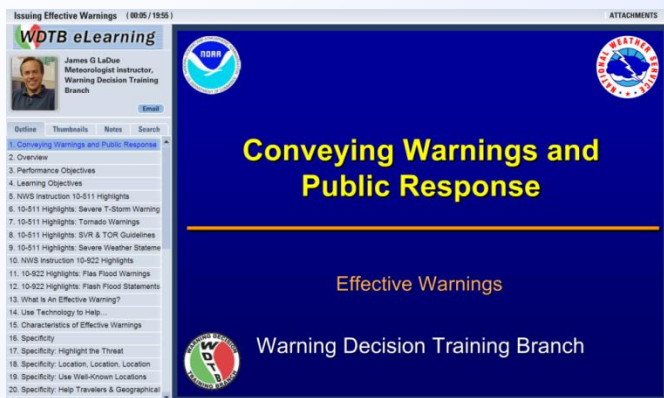
Social Media module
(new for FY15)

Flowchart / mind map of contributing factors:

- **?**
  - **Tornado occured**
- **Lack of effective training**
  - **No training shifts**
    - **No culture of performance improvement**
    - **Insufficient management support**
  - **Inability of SOO to transfer training into office performance**
- **Tornado warning issued with negative 15 min lead time**
  - **Loss of Situational Awareness**
    - **Lead (WC) was overwhelmed working on grids**
    - **Insufficient staffing**
      - **SOO was distracted**
      - **Lead (WC) released previous shift too early**
  - **Poor communication**
    - **Warning team did not know roles & responsibilites**
    - **Intern afraid to speak up due to face threat**
  - **Equipment/ technical issues**
    - **AWIPS was slow**
      - **ETs unable to fix AWIPS in a timely manner**
    - **Meso & TVS algorithms did not trigger**
    - **Insufficient radar sampling**
      - **Radar was 70 mi away**
      - **Radar was in VCP 12**
        - **Radar switched to backup power**

AWOC Severe
Continuous and Blended Learning

Delivery: May – Sep 2015

Duration: 10 – 12 hours

Storm-of-the-Month Webinars

Stand-Alone Module: Available: Feb 2015

Impact-Based Warning Module

WES-2 Simulation Exercises

Web-Based Modules

Threat-Based Learning Plans

Forecast Challenge
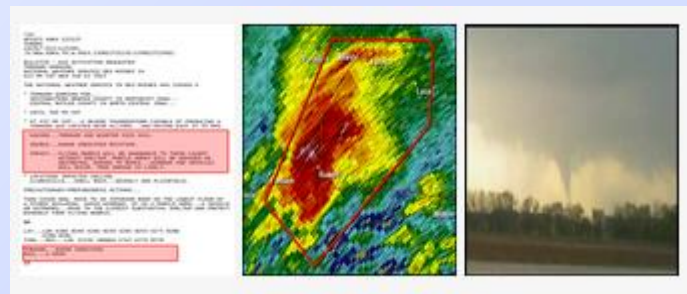
Warning Decision Instructor-Led Sessions
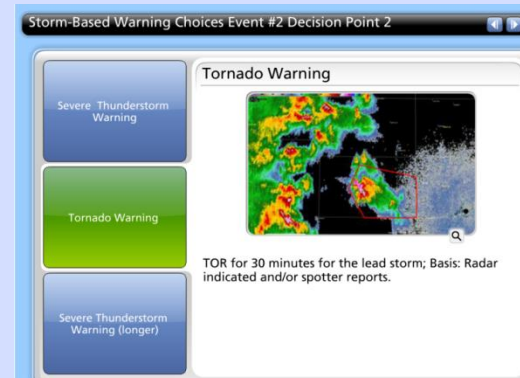
AWOC Flash Flood

- ## Expected Changes
  - AWIPS-2 Simulation
  - Updates for Hazard Services (hopefully!)
  - MRMS QPE Products

- ## Delivery Dates
  - June – Sept 2015

Flash Flood Track

For a detailed description of each IC, click on the name of the IC. Once the panel is open, you can access the training materials in one of two ways:

1. Clicking on the link associated with the name of each lesson or
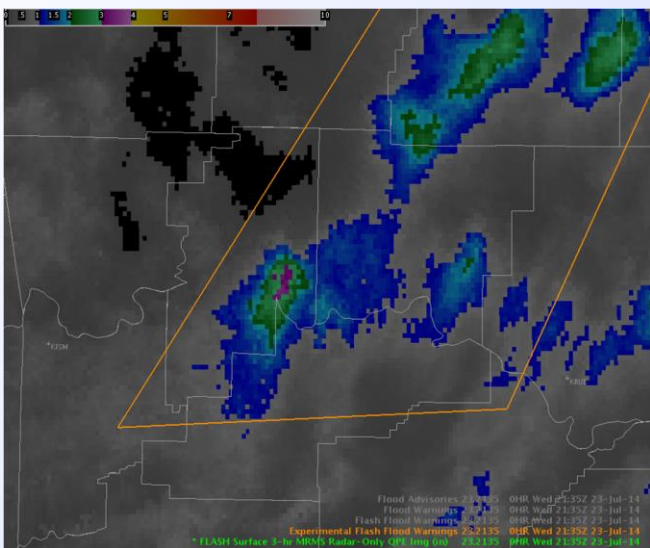2. Click on the download icon to save a ZIP file with the training materials to your local hard drive.

AWOC Flash Flood Pre-Requisite Courses

AWOC Flash Flood Course Material

Brief Description: Course materials address synoptic-scale patterns that enhance heavy rainfall and flash flood potential as well as meteorological ingredients that enhance heavy rainfall and flash flood potential. In addition, modules address how to effectively use FFMP to diagnose flash flooding potential at the basin level. Best practices are provided for issuing basin-based flash flood warnings, including criteria for issuing flash flood emergency.

Delivery Methods: Web modules

Approximate Completion Time: 3 hours

Flash Flood Track: Training Implementation Information Briefing **Download**
Flash Flood Conceptual Models (AWOC Severe IC 1, Lesson 3) **Download**
On the Value of Anomalies (High Impact Hydro Events, Part 1) **Download**
Ensembles and Anomalies (High Impact Hydro Events, Part 2) **Download**
FFMP and Issuing Basin-Based Flash Flood Warnings (Flash Flood Warning Best Practices, Part 1) **Download**
How and When to Use "Flash Flood Emergency" (Flash Flood Warning Best Practices, Part 2) **Download**
The Meteorology Behind Extreme Rain Events (Flash Flood Warning Best Practices, Part 3) **Download**

AWOC Flash Flood WES Simulations

AWOC Winter Weather

Winter weather warning PDS meeting

- Late June 2015

- At WPC in College Park

- Includes up to 18 subject matter experts

- Will serve as instruction design for AWOC Winter

AWOC Winter Delivered starting August 2016

Roles and Responsibilities
Who Transfers Training into Performance?

The Top 6 Factors Transferring Training into Performance	Instructors, SOOs, DOHs	Forecast Staff	Managers: Local, Regional, National
Individual capability	I	F	M
Necessary skills and knowledge	I	F	M
Clear consequences	I	F	M
Clearly Defined Expectations	I	F	M
Necessary support	I	F	M
Prompt feedback	I	F	M

(Dr Mary Broad, 2006 & 2008)

Four Things to Remember About Warning Decision Training in FY15

- Focus on Forecaster Service Performance
  - Training Tools and Skills
  - Foundational Training
  - Services Training
- Leverage Blended Learning
  - LMS Modules
  - Instructor Led Training
  - Webinars
  - Simulations
  - Forecast Challenges
  - Forecast Discussions
- Provide Continuous Learning Opportunities
- Get Stakeholders Engaged